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High Transparent, High Mobility MoO3 Intergraded InZnO Films for Use as a Transparent Anode in Organic Solar cells

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We reported on the electrical, optical, structural and morphological properties fabricated by co-sputtering for use as an anode for organic solar cells (OSCs). By adjusting RF and DC power of MoO_3 and IZO targets during co-sputtering, we fabricated the MoO_3-IZO electrode with graded content of the MoO_3 on the IZO films. At optimized MoO_3 thickness of 20 nm, the MoO_3 graded IZO electrode showed a higher mobility (33 cm^2/V-Sec) than directly deposited MoO_3 on IZO film (26 cm^2/V-Sec). At visible range (400nm～800nm), optical transmittance of the MoO_3 graded IZO electrode is higher than that of directly deposited MoO_3 on IZO film. High mobility of MoO_3 graded on IZO is attributed to less interface scattering between MoO_3 and IZO. To investigate the feasibility of MoO_3 graded IZO films, we fabricated conventional P3HT:PCBM based OSCs with MoO_3 graded IZO as a function of MoO3 thickness. The OSC fabricated on the MoO_3 graded IZO anode showed a fill factor of 66.53%, a short circuit current of 8.121 mA/cm^2, an open circuit voltage of 0.592 V, and a power conversion efficiency of 3.2% comparable to OSC fabricated on ITO anode and higher than directly deposited MoO_3 on IZO film. We suggested possible mechanism to explain the high performance of OSCs with a MoO_3 graded IZO.

Keywords: Transparent conducting oxide (TCO), graded, Organic solar cell